

Blueprint Index

Nonresidential Standards

P400-00-006

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Nonresidential Blueprints

Blueprint # 12

Q: An open mezzanine, that creates additional floor area, is being added inside an existing office building. Is this creating conditioned space?

A: If the mezzanine is being added within the previously conditioned space of the building and is not adding volume to the conditioned space (i.e. raising the ceiling), it is only adding square footage of floor area. It is not creating new conditioned space.

Blueprint # 25

Q: I'm designing a space that will have hard-wired neon lighting. Does this neon lighting have to be included in compliance calculations?

A: Yes. Hard-wired neon lighting must be included in your lighting calculations.

Blueprint # 28

Q: Do commercial coaches have to meet the California Energy Commission's energy efficiency standards?

A: No. Commercial coaches, and special purpose commercial coaches, as defined in the California Health and Safety Code, are not subject to the Building Energy Efficiency Standards because they are built to a unique standard for portable structures. A commercial coach is one designed for professional, commercial, or industrial use. It will have a Department of Housing and Community Development (HCD) insignia of approval on it indicating it has met the applicable standards. Special purpose commercial coaches are less than 8-½ feet wide and less than 40 feet long, do not require an "oversize load" permit to transport on California highways, are on a chassis, and have a HCD insignia of approval. Questions regarding commercial coaches can be directed to HCD at (800) 952-5275. [Note: Pre-engineered buildings (e.g. ARMCO, Butler) must meet energy standards.]

Blueprint # 36

Q: When is an equipment alteration considered a repair, which is not subject to the Building Energy Efficiency Standards?

A: When a part or parts of a system are replaced with like equipment (capacity and type are the same) because of age or defects in the system, it is considered a repair. Repairs do not have to meet current building energy standards. Appliance efficiency standards still apply.

Blueprint # 41

Q: Are occupancy sensors required by the new standards? Will ultrasonic occupancy sensors be allowed for complying with the new standards?

A: Occupancy sensors are not required by the new standards. In many cases, lighting controls are required, but occupancy sensors are not the only type of control that can meet this requirement (Energy Standards Section 131). Occupancy sensors used to meet the control requirements must conform to the criteria of Section 119. As long as the ultrasonic sensor meets the requirements of Section 119, it can be used for compliance.

Blueprint # 43

Q: There aren't any ventilation rates for H occupancies in either the Energy Efficiency Standards (Table 1-F) or the Nonresidential Manual (Table 4-2). What if I have soldering, welding or some other activity not listed that requires more than the "all other" category allowance of 0.15 cfm/square foot of conditioned floor area?

A: For any occupancy type, if the Uniform Building Code or Uniform Mechanical Code have a higher ventilation rate, use the higher rate.

Q: What are the economizer requirements for nonresidential buildings meeting prescriptive HVAC standards?

A: Economizers are only required when equipment capacity exceeds 75,000 Btu/hr of mechanical cooling capacity and 2,500 cfm design supply capacity (see energy Efficiency Standards, Section 144(e)). These upper limits apply to each piece of equipment individually. If a building or space has multiple pieces of equipment, the cooling and supply capacities are not combined to determine if an economizer is required.

Blueprint # 45

Q: The MECH-1 form has a section entitled “proof of envelope compliance” with two boxes - “previous envelope permit” or “envelope compliance attached.” How do I determine which box to check, particularly for a mechanical permit on a building built before energy standards existed? Don’t the standards only apply to the permitted work?

A: For a building built before Energy Standards, and for any conditioned space with tenants, check the “previous envelope compliance” box.

If there were not previous tenants, or the space was occupied but unconditioned, check “envelope compliance attached” and attach either a copy of previously submitted documentation or current compliance documentation.

Although the standards only apply to the construction which is the subject of the permit, some building owners chose to designate their buildings (particularly multi-tenant shells) unconditioned for purposes of energy compliance, delaying energy compliance until a space became conditioned. In such a case, when the permit for mechanical equipment is sought, it is to condition a previously unconditioned space (an “addition”) and requires envelope compliance.

Q: If I have a building with more than one occupancy type, can I meet one set of standards for the dominant occupancy? Do I meet the mandatory measures applicable to the dominant occupancy?

A: The exception to Section 100(e) of the Energy Efficiency Standards allows you to show compliance with the standards applicable to the dominant occupancy for the entire building if the dominant occupancy makes up at least 90 percent of the conditioned floor area. You must, however, meet the mandatory measures applicable to the actual occupancies, not the dominant occupancy.

Q: If I have an unconditioned warehouse with a small office (consisting of less than 10 percent of the building), is the office exempt under the mixed occupancy exception?

A: No. The exception to Section 100(e) applies to conditioned floor area in buildings within the scope of the Energy Efficiency Standards (Section 100(a)).

Q: When using the prescriptive compliance approach for a building envelope, are doors included in the gross exterior wall area? Do the doors need to meet any U-value requirements?

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A: The gross wall area is the entire area of exterior surfaces, including windows and

doors. Demising walls (walls between conditioned space and enclosed unconditioned space) and party walls are not counted as gross exterior wall.

There are no maximum U-value requirements applicable to doors in either the component or overall envelope compliance methods (prescriptive). Aside from the area of doors being included in the gross exterior wall area, and any glazing in doors included as window area, opaque doors are not included in prescriptive compliance calculations.

Q: When calculating equipment loads and indicating equipment selection on the MECH-2 form are these sensible or total loads?

A: Comparison of either sensible loads and sensible capacities or total loads and total capacities can be made on the MECH-2 form (Nonresidential Manual, Chapter 4). Be sure to note on the MECH-2 which value you used to size and select equipment.

Q: When using the prescriptive compliance method for a package HVAC system, can the capacity for both the heating and cooling exceed the maximum allowable loads as calculated on the MECH-4?

A: Yes, if it is necessary in order to get the appropriate size equipment. Energy Efficiency Standards, Section 144(a), allows you to select the smallest size, within the available options of the desired equipment line, necessary to meet both heating and cooling loads. For example, assume you have calculated a heating load of 190 kBtu/hour and a cooling load of 110 kBtu/hour. The product line you have selected comes with either a capacity of 170 kBtu/hour heating and 90 kBtu/hour cooling, or 200 kBtu/hour heating and 120 kBtu/hour cooling. The latter piece of equipment is probably the most appropriate selection even though it exceeds both heating and cooling maximum allowable load.

Q: If I am using an automatic time switch to control the lights in a single-story, 8,000 square-foot (single meter) building, how many control devices and how many override switches do I need to install?

A: One automatic time switch with at least two manual overrides. Any building or separately metered space exceeding 5,000 square feet must have some type of shut-off control for every floor (Section 131(d)1). When an automatic time switch is used, an override switch is also required. Each override switch must control an area that is 5,000 square feet or less (Section 131(d)2). the override activates the power within the controlled space allowing lights to be turned on for up to two hours during normally unoccupied times.

Blueprint # 45 continued...

Q: Do hotel/motel guest rooms and high-rise residential occupancies have to meet

the kitchen and bathroom lighting requirements applicable to low-rise residential buildings?

A: The lighting requirements for hotel/motel guest room kitchens and bathrooms are contained in Section 130(b) of the Energy Efficiency Standards, and are the same as those applicable to low-rise residential buildings (Section 150(k)). Up to 10 percent of the number of guest rooms may be exempted from the lighting requirements.

Blueprint # 46

Q: Does the square footage calculation for gross sales area in a retail space exclude areas of floor displays?

A: No. The gross sales floor area, as defined in Energy Efficiency Standards Section 101(b), includes floor space used for the display and sale of merchandise.

Q: When is the wattage for exhaust fans NOT counted, in determining whether total fan energy exceeds 25 horsepower?

A: Fans that exhaust only unconditioned air are not counted when calculating fan energy (Nonresidential Manual, Chapter 4). Some examples are fans in unconditioned mechanical rooms or unconditioned garage exhaust fans.

Q: I have several questions related to lighting alterations and application of the Energy Efficiency Standards (Section 149):

When is it necessary to calculate the existing watts per square foot for alteration requirements?

A: Section 149(b)1.C. specifies that you must meet current standards for lighting power density (Section 146) if the alteration results in an increase in the connected lighting load or involves replacing more than 50 percent of the lighting. It may be necessary to calculate the existing wattage to demonstrate that the alteration does not result in an increased lighting level.

To determine existing lighting levels, use the same methodology used for new lighting installations (Nonresidential Manual, Chapter 5). For example, track lighting is counted at 45 watts per linear foot of track. Use a form LTG-2 noting that it is the “existing” lighting power.

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Q: What is the correct way to determine if 50 percent or more of the fixtures are

being replaced? For example, all of the fixtures in the 2,000 square-foot cafeteria of a 20,000 square-foot multi-story office building with one tenant are changing.

A: The 50 percent or more fixture replacement is based on the permitted space (not the building space) that is being altered, therefore you must comply with Section 146 because 100 percent of the fixtures in the cafeteria are being replaced.

Blueprint # 47

Q: I have an existing building with a heating system only. If I am adding cooling and using existing duct work, do I have a new system? Do I need to meet ventilation requirements? If I do not currently have a ventilation system and I do not propose a new ventilation system, do I have to meet ventilation requirements?

A: Adding an air conditioning (cooling) unit is adding a system. A system is defined as a combination of equipment, controls, accessories, interconnecting means, or terminal elements, by which energy is transformed to perform the function of space conditioning (Energy Efficiency Standards, Sections 112, 121 and 122 [Section 124 applies to any new duct work]) and either prescriptive or performance requirements (Section 144). Using existing duct work does not eliminate the need for complying with current ventilation requirements unless (1) it is physically impossible to bring in outside air or (2) it would, in the building official's judgment, cause a hardship. NOTE: The ventilation requirements apply to this new cooling system only, not to the existing heating system.

Q: When are vapor barriers required for nonresidential buildings?

A: Nonresidential buildings are not required to have vapor barriers installed in walls and attics unless the building will be insulated with urea formaldehyde foam insulation. Any building type (residential or nonresidential) installing urea formaldehyde foam insulation is required to have a polyethylene vapor barrier or equivalent plastic sheeting vapor barrier installed between the insulation and the interior space. (Energy Efficiency Standards, Section 118(b)).

Also, in accordance with Uniform Mechanical Code Section 1005 (Table 6-D), vapor barriers must be installed on ducts when condensation may impair the effectiveness of the insulation. Specifically, on supply ducts in spaces vented to the outside in geographic areas where the average July, August and September mean dew point temperature exceeds 60 F. (Nonresidential Manual, Chapter 4)

When pipes carry cold fluids, the Nonresidential Manual (Chapter 4) recommends a vapor barrier or some other material to prevent condensation from interfering with the effectiveness of piping insulation.

Q: What is visible light transmittance and where can I find this information?

A: Visible light transmittance (VLT) is the ratio of visible light transmitted through glazing material to light that strikes glazing material.

VLT is specific to each glass type and must be obtained from the manufacturer's literature. VLT can also be found in the data libraries within the computer program Window 4.0 adopted by the National Fenestration Rating Council.

Q: Can I get credit for automatic daylighting controls, or are they just an alternative way to meet the mandatory requirement for separate switching of the daylit area?

A: You can get credit for automatic daylighting control devices even if you are using them to meet a mandatory requirement. The amount of the credit, the power savings adjustment factor, will vary based on the window-to-wall ratio (or percent of exterior roof area for skylights), and whether the control is stepped or continuous dimming. Credits vary from 0 to 0.40 for automatic daylighting controls. (Energy Efficiency Standards, Section 146 (a), Table 1-L)

Blueprint # 48

Q: Who can sign the Certificate of Compliance forms? Where can I call if I have more questions?

A: The person who can sign the Certificate of Compliance is the person who can legally accept responsibility for a project, as regulated by the Business and Professions Code.

For example, a mechanical engineer can sign and take responsibility for mechanical design work; a mechanical contractor can only sign and take responsibility for design work that he/she will install. (Most types of residential construction do not require a licensed person for either design or construction work.)

The scope of work is the determining factor in whether a particular license is required in order to accept responsibility for a project and subsequently sign the Certificate of Compliance. Licensed professionals with questions about their ability to accept responsibility for a given project can contact the appropriate office within the Department of Consumer Affairs:

Engineers	-	(916) 263-2222
Contractors	-	(916) 255-3985
Architects	-	(916) 324-9914

If you are signing a Certificate of Compliance, it is up to you to know whether you are authorized to take such legal responsibility for work being done. If you are not licensed, you may need to consult with an attorney to determine if you can legally take responsibility.

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Q: Are door areas considered in envelope calculations? If so, where? And do they

have to meet a U-value requirement?

A: The area of doors is included only in the gross wall area (not in the exterior wall area) for prescriptive compliance. For performance compliance, doors are modeled as an opaque surface. (Any glass in doors must be included in window calculations.) There are no U- or R- value requirements applicable to opaque doors (Energy Efficiency Standards, Section 143(a)7) and approved computer programs model doors with the same characteristics in both standard and proposed design.

Q: **In an unconditioned multi-tenant shell, if a space adjacent to my tenant space is currently unoccupied, do I assume interior walls are demising walls even though the space may not remain unconditioned?**

A: Yes. Prescriptive compliance requires that any demising walls/partitions be insulated to R-11; performance compliance requires that insulation levels modeled (including demising walls) be installed.

Q: **How do I show compliance for central plant systems that are oversized for future capacity needs? For example, I am ducting off the central plant system to space condition five offices and one control room-the rest of the system is for manufacturing process loads ($\geq 900,000$ Btu boilers chillers) with 100 percent air flush in the manufacturing area.**

A: Prepare energy calculations/load calculations for the five offices and control room; plans and specifications documenting future loads must accompany the energy compliance documentation. On the MECH-2 Part 1 form, where installed capacity is larger than needed, the explanation should indicate “excess capacity for future manufacturing area.”

Q: **Can I use the tailored lighting and area category methods in the same structure?**

A: You are limited to one method per permit (Energy Efficiency Standards, Section 146(b)). Each permit applicant can select a lighting compliance method independent of the remainder of the building.

Q: **How are categories selected in the Area Category Method for lighting compliance (Energy Efficiency Standards, Section 146(b)2)?**

A: The category selections are based on the primary function occurring in an area surrounded by floor to ceiling partitions. Each primary function must be listed separately. Select the primary function based on the defined “occupancy types”

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found in Section 101(b). Any function not defined may be categorized as “support space.”

Please provide additional guidance for display calculations in the tailored lighting method (Section 146(b)3) (LTG-4 form).

Q: When can I take credit for displays?

A: You can take credit for displays only when such areas are called out on the plans. These credits are sometimes called “use it or lose it allowances” because your allowed watts will either be the calculated allotment (e.g., 2.2 watts per square foot of wall area) or your proposed design watts, whichever is less.

Q: What if the display lighting exceeds its allotment and I don’t want to change the design?

A: Lighting allotments from the gross sales area, or any area other than display, can be used to provide additional lighting for the display. On the LTG-4, part 1 (tailored LPD summary), the total allowed watts are a combination of display lighting, gross sales area, and support spaces. At the time of installation, allowed lighting from the gross sales area can be used to supplement the allowed watts for displays. (This is reflected in the “actual lighting power” section of the LTG-2 where “adjusted actual watts” cannot exceed “total allowed watts” from LTG-4. Information from the LTG-2 is carried forward to the LTG-1.)

Q: Is the floor area for feature floor displays subtracted from the gross sales floor area?

A: No. Neither is the area of feature wall displays subtracted from the gross sales wall \ area.

Q: When is a display a “feature display?”

A: A feature display requires special highlighting to attract attention and visually distinguish the display from the surrounding area (Section 101(b)). Feature displays get 13 to 26 watts per square foot and cannot exceed 10 percent of gross wall or floor area (stores with less than 800 square receive an allotment of up to 1,000 watts for feature floor displays).

Blueprint # 50

Q: What are the different types of display lighting available for a retail store using the tailored lighting method for compliance? How can I determine which type of display lighting I have?

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A: There are four types of displays - Floor, Wall, Sales Feature Floor, and Sales Feature

Wall displays.

Floor displays are already included in the gross sales floor area along with dressing rooms, sales transactions and circulation areas; the gross sales floor area receives 2.2 Watts/square foot.

Wall displays are called gross sales wall area and receive an allotment of 2.2 Watts/square foot, limited to the actual areas of wall display.

Feature display allotments are based on a need for special highlighting to attract attention to the item being sold and to visually set it apart from surrounding areas. Feature displays receive either 13 or 26 Watts/square foot (illuminance category G), depending on the area of the display and the throw distance (see Energy Efficiency Standards, Section 146(b), Table No. 1-R).

Sales feature floor displays highlight items not accessible to the customer (although accessible items may be nearby). The allotments are in addition to gross sales areas (that is, the display floor area is not subtracted from gross sales area). Such displays are limited to 10 percent of the gross sales floor area, except in very small stores. If a store is less than 800 square feet, the allotment for feature floor displays is 1,000 Watts (Section 146(b)3.D.ii.). The allotments must be used for the displays-any excess lighting cannot be used to supplement gross sales area lighting.

Sales feature wall displays require open shelving or an internally lit, see-through display case. The light source for feature wall displays must be within reasonable proximity of the wall and must be focused on the display, not on the display and the surrounding area. Feature wall displays are limited to 10 percent of the wall area and any excess lighting cannot be used to supplement gross sales area lighting.

Q: If I use the area category method, do I have to separate out such areas as bathrooms and corridors from the allowed lighting level (e.g., 1.6 Watts/square foot for office)?

A: Yes. Any area separated by interior partitions must be given a separate area designation.

Q: For a building with an HVAC system in excess of 75,000 Btu, which was modeled using a performance compliance approach, do I need to install an economizer?

A: An economizer must be installed only when an economizer is modeled as part of the proposed design to achieve compliance. Economizers are not a “mandatory” requirement [in the prescriptive approach (Energy Efficiency Standards, Section 144(e)), they are required under certain conditions (based on capacity and air flow)]. However, it should be noted that for large HVAC equipment, the standard

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design (energy budget) will assume an economizer. This will reduce the budget for the proposed design by 30-35 kBtu/ft², making it difficult to get compliance without an economizer.

Q: I've calculated the mechanical ventilation for a barber shop, per Energy Efficiency Standards Section 121(b)2.A and B., as follows:

A. $2,000 \times 0.40 = 800$ cfm

B. $15 \times (40) = 600$ cfm

Do I need a system capable of supplying 600 or 800 cfm?

A: The mechanical system must provide 800 cfm or more. The system must be capable of providing no less than the larger of A or B.

Q: When calculating the minimum ventilation requirements for a space with fixed seating, can I assume one-half the number of seats as the expected number of occupants?

A: No. Spaces with fixed seating must use the number of seats as the expected number of occupants when calculating their mechanical ventilation requirements. An arena, for example, is often filled to capacity for anywhere from two hours (for a concert) to eight hours or more (for conferences). Regardless of the duration of an event, the system must be capable of providing adequate ventilation.

Q: Can you suggest some ways of meeting the ventilation requirements for spaces such as theaters or churches where occupancy levels can vary greatly?

A: As recommended in the Nonresidential Manual (Chapter 4), such spaces can reduce ventilation when they are not fully occupied by using a demand control ventilation device (see also Energy Efficiency Standards, Section 121 (c)1). These devices, which must be certified to the Commission, can reduce the ventilation rate down to 0.15 cfm per square foot when the space isn't fully occupied. While such devices do not eliminate the need for the system to be capable of supplying full outside air levels when required, they can reduce operating costs without sacrificing comfort.

Q: Are there any options for providing ventilation besides mechanical ventilation?

A: Outdoor air requirements can sometimes be met with natural ventilation. Two conditions are required: (1) the openable area of accessible windows/doors/skylights must be at least 5% of the conditioned floor area; and (2) all spaces must be within 20 feet of these openings (without obstruction). If

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these two conditions are met, ventilation requirements can be met with natural ventilation.

Q: Can the ventilation requirements of a space be met with a mixture of natural and mechanical ventilation?

A: No. Each space must use either mechanical or natural ventilation (Energy Efficiency Standards, Section 121(b)). Using natural ventilation may negatively impact the efficiency and operation of a central system if the outside temperature is warmer or cooler than the inside temperature setting.

Q: If a space contains some process loads, but isn't exempt from the standards (i.e., it is maintained within the comfort range of 55-90°F), how do I indicate these loads in my compliance documentation/calculations?

A: Process loads are included as "other" loads in the sizing calculations (MECH-4 form/computer inputs). These loads should be described or explained in the compliance documentation.

Q: If including process loads in sizing calculations results in equipment being large enough to require an economizer with prescriptive compliance, do I have to have one, or is there an exception for process loads?

A: There are some exceptions for the economizer requirements, but not specifically for process loads. The three exceptions are: (1) high-rise residential living quarters and hotel/motel guest rooms; (2) where special air treatment equipment is required due to outdoor contaminants; and (3) where outside air for cooling will adversely affect other systems (humidification, refrigeration, etc.) resulting in increased energy use (Energy Efficiency Standards, Section 144(e)).

Blueprint # 51

Q: Can I use gas absorption chillers (or any other type of equipment not regulated by the Appliance Efficiency Regulations) and still be in compliance with the building Energy Efficiency Standards?

A: Yes. The Energy Efficiency Standards, (Section 110-111) require certification to any "applicable" appliance standards. For some types of equipment the Energy Efficiency Standards (Section 112) contain minimum efficiency requirements. And for other types of equipment there are no efficiency requirements.

Q: If a gas absorption chiller (or other equipment not regulated by the Appliance

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Efficiency Regulations) is proposed for a building, can I get efficiency information from the Commission? Are there any limitations with either the prescriptive or performance approach?

A: Efficiency information should be obtained from the manufacturer. The Commission may have information where a manufacturer has voluntarily listed their equipment.

The prescriptive compliance approach (Energy Efficiency Standards, Section 144) does not require a minimum efficiency, so no efficiency information is required beyond verifying certification, if applicable.

In the performance compliance approach (Energy Efficiency Standards, Section 141) the program determines the energy budget (standard design) by modeling one of five specific types of HVAC systems, based on the building type (residential, nonresidential, etc.), heating fuel source, and number of zones served by the system. The program's calculation engine will limit the types of equipment that can be modeled for the proposed design. If the equipment type can be modeled, one of five standard HVAC system types will assumed in determining the energy budget/standard design.

You should consult the program users' manual for modeling instructions for the proposed equipment type. If there are no instructions in the user's manual, a program vendor must propose an optional capability to model new or different HVAC equipment or systems. This optional capability must receive approval from the Commission. Until such a method is approved, the equipment cannot be modeled using a performance compliance approach.

Q: Can I install one automatic time switch (ATS) control device override control in a 5,000 square foot space and be in compliance with the shut-off requirements of Section 131(d), or do I need an override control in each area enclosed by ceiling-height partitions?

A: If the ATS device and override controls are installed to meet only shut-off requirements, each area with ceiling-height partitions does not have to have an individual override control. However, if the override control is also being installed to meet the "bi-level illumination" requirements of Energy Efficiency Standards, Section 131(b), each area with ceiling-height partition must have an override control (Exception No. 3).

If the override is installed to comply with shut-off control requirements only, although there is no requirements for a separate override control in each room, there are some requirements to consider other than the 5,000 ft² maximum area. [The 5,000 ft² maximum is increasing for some occupancies effective July 1, 1995.] The Standards (Section 131(d)2.A.-E.) require that the override control be installed so that it can be reached quickly ("readily accessible"), and the person activating the override switch can either see the lights being controlled or the device visually signals that the lights are on or off in a given space ("annunciation").

Q: Can I use occupancy sensor to meet all of the interior lighting control requirements of the Standards (Section 131)? If so, would one occupancy sensing device on each floor of the building be adequate?

A: Occupancy sensing devices will satisfy the requirements of Sections 131(a), (b), and (d) , but not (c) unless there is also a manual switch in series with the occupancy sensor.

Area controls (Section 131(a)) require that each area enclosed by ceiling-height partitions have an independent control; spaces with occupancy sensing devices do not have to meet Section 131(b); and shut-off controls requirements (Section 131(d)) for buildings with 5,000 square feet or more can be met if the devices also meets Section 119. The installation must be “in accordance with manufacturer’s instructions” (Section 119(h)). When properly installed, the device must be able to sense occupancy in all spaces or rooms that are being controlled, which will require multiple sensors to prevent lights from going out while the building is still occupied. Occupancy sensing devices do not satisfy the requirement for separate switching within daylit area (Section 131(c))-occupants must be able to reduce the lighting level when there is adequate daylight available.

Q: Can I get control credit for an occupancy sensor (Section 146(a)2) if it also being used to satisfy mandatory requirements for room switching and bi-level illumination?

A: Yes.

Blueprint # 52

Q: What are the new occupancy groups from the 1994 Uniform Building Code? And how are compliance calculations affected?

A: The scope of the 1995 Energy Efficiency Standards (Section 100) is occupancy groups A, B, E, F, H, M, R and S. A summary of these occupancy groups [changes did not affect residential occupancies] is:

- A. An assembly room with an occupant load of 300 or more, including buildings used for educational purposes which are not Group E or B.
- B. Office, professional or service-type transactions; storage of records and accounts; and eating and drinking establishments with an occupant load of less than 50.
- E. Buildings used for education purposes through the 12th grade; any building or portion of a building used for day-care purposes for more than six persons.
- F. Factory and industrial facilities involving low and moderate-hazard materials.
- H. Buildings with specified quantities of materials which present a fire or explosion hazard; repair garages and aircraft repair hangars not classified as Group S, and heliports.

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- M. Merchandise display and sales.
- S. Storage of low and moderate-hazard materials; repair garages without open flame or welding; parking garages.

Buildings of these occupancy groups which meet the other criteria for being within the scope of the Standards (permitted, conditioned space) must comply with the nonresidential standards.

Q: How are process loads handled in the computer compliance approach? Do they result in a credit? For example, a small office building with substantial glazing, 6 Watts/ft² of lighting and a 120,000 Btuh cooling load, is claiming a process load of 15 Watts/ft². Their total cooling capacity is 199,000.

A: There is no credit for process loads. The reference building (standard design) will have the same process loads as the proposed building. The applicant must, however, justify the amount of the process loads. If the cooling load, including the process loads, is 199,000 Btuh, this capacity is compared with the capacity of the HVAC unit for the reference building which includes the process load +21% (Energy Efficiency Standards, Section 144 (b); Nonresidential Manual, Chapter 4; Alternative Calculation Methods Manual (April 1992), pp. 32 and 62.)

Q: When preparing lighting compliance calculations, Section 146 (a) 3.D of the Energy Efficiency Standards indicates that I do not have to include wattage from “specialized local lighting installed in non-lighting equipment by its manufacturer.” What are some examples of equipment types which can be excluded?

A: Examples of lighting wattage which can be excluded from total wattage calculations include:

- Lighted signs (if they are not hardwired)
- Walk-in freezer
- Cabinetry that is not movable and not used for display purposes with built-in lights
- Food dispensing machines
- Drink dispensing machines
- Industrial equipment such as that used by manufacturing facilities (drill press, sewing machines, etc.)
- Refrigerators or coolers including walk-in refrigerators or coolers

Q: Is a light fixture in a site built walk-in refrigerator or cooler excluded from the lighting wattage calculations?

A: If the space is maintained at a temperature of less than 55°F, it is outside the scope of the standards and energy compliance is not required for the space occupied by the site built walk-in unit. (See “directly conditioned space,” Section 101(b).)

Q: If the lighting is excluded for refrigerated display cases or walk-in refrigerators, should the floor area occupied by these units be excluded from the lighting calculations?

A: Since it is part of the conditioned space, the floor area occupied by refrigerated display cases is included as floor area for the lighting calculations. (This is similar to “gross sales area” which includes areas associated with the display and sale of merchandise.) Walk-in refrigerators or freezers, however, are enclosed, unconditioned space and the floor area associated with them is not included as floor area in the energy compliance calculations.

Q: Is a light fixture under a restaurant exhaust hood built over a stove or grill exempt from lighting wattage calculations?

A: If the light is installed in the exhaust hood by the manufacturer, it can be excluded (Energy Efficiency Standards, Section 146(a)3.D.). Otherwise, the lighting is not “integral to food preparation equipment” and must be included in the lighting calculations.

Blueprint # 53

Q: In calculating lighting compliance, how is the wattage for incandescent fixtures supposed to be determined?

A: It is greater of either the proposed fixture lamp wattage or 75 watts per fixture.

Q: One exception for lighting shut-off controls is for “an area that must be continuously lit, or lit in a manner requiring manual operation of the lighting” (Section 131(d)1, Exception No. 2). What are some examples of the correct application of this exception?

A: An area which must be continuously lit would operate 24 hours, such as hotel lobbies and 24-hour grocery stores. Thus, at no time would the lights be shut off. The latter part of the exception is provided for:

Spaces which always have varying and unpredictable operating schedules, such as live performance theaters, arenas, and concert venues.

Space with lighting systems equipped with high intensity discharge (HID) lamps AND where the use of the space results in unpredictable on/off operation. The space requires manual operation because of the longer start/restart time of HID lamps coupled with the unpredictable schedule.

Please note that most facilities equipped with HID lighting will not fall under this exception because an operating schedule will be reasonable to predict. A facility with a predictable operating schedule and metal halide lighting could still use automatic shut-off without posing a risk to people working or conducting business in the building.

Q: What R-value can I use for a crawlspace in a nonresidential building?

A: You may use an R-6 in assembly calculations for the crawlspace (see Table B-7 for sample floor assembly calculations). This R-6 value cannot be used when the floor is over a basement or underground parking facility.

Q: With the special construction requirements for suspended (T-bar) ceiling eliminated, are there any construction requirements or special modeling details to consider?

A: Standards construction is adequate for meeting the infiltration/exfiltration requirements of the standards. If insulation is placed on the suspended ceiling, however, recessed lights must either be IC-rated (approved for insulation cover) or areas without insulation must be accounted for in the overall assembly U-values.

When recessed lights are not IC-rated, the ceiling is modeled as two parallel assemblies. The first assembly consists of ceiling insulation, acoustic tile and a T-bar grid. The second assembly consists of the luminaries alone. The effective R-value of the first assembly is the sum of the T-bar/acoustic tile combined R-value, ceiling insulation and two inside air film resistances (0.61 R-value per air film). Because of the metal grids, you may only use up to 50 percent of the tile's R-value for the T-bar/acoustic tile combined R-value.

For the second assembly, the R-value of the light fixture should be calculated as two inside air film resistances (0.61 R-value per air film). If the fixtures include plastic diffusers, the R-value of the light fixture should be calculated as two air film resistances and a 1.5 inch air space (0.77 R-value).

The overall assembly R-value will be calculated as the inverse of the area weighted average U-values of the two parallel assemblies.

For example, if 10 percent of the ceiling is light fixtures without plastic diffusers and 90 percent is R-19 insulation with ½" tiles (tile R-value 1.2), the calculation would be:

$$\text{Assembly \#1 } R = 19 + [1.20/2] + 0.61 + 0.61 = 20.82$$

$$\text{Assembly \#2 } R = 0.61 + 0.61 = 1.22$$

Overall U-value =

$$[(1/20.82) * 0.90] + [(1/1.22) * 0.10] = 0.1252$$

$$\text{Overall R-value} = 1/\text{Overall U-value} = 8.0$$

NOTE: You cannot use EZFRAME program or ENV-3 form for T-bar ceilings.

Blueprint # 54

Q: Does changing the occupancy of a building require compliance with the current energy requirements for the new occupancy?

A: Only features or components which are the altered must comply with the requirements of the new occupancy (Nonresidential Manual, Section 2.2.7.)

Q: When is demising wall insulation required? And how much insulation is required?

A: Demising wall insulation (R-11) is a mandatory requirement for framed walls (Energy Efficiency Standards, Section 118 (e)). Therefore, any time envelope compliance is required, these walls separating conditioned and unconditioned space must be insulated to R-11.

Q: When does an alteration to a mechanical system require that I install an economizer?

A: Since an economizer is not a mandatory requirement, alterations to components of an existing mechanical system do not require the installation of an economizer. Alterations which consist of adding a new system must install an economizer when two conditions are met: (1) the new system has a design supply capacity that is greater than 2500 cfm and over 75,000 Btu/hour of mechanical cooling capacity, and (2) compliance is demonstrated using the prescriptive approach (Energy Efficiency Standards, Section 144). [Note: If performance compliance is used for the new system, an economizer is required only if one is modeled as part of compliance.]

Blueprint # 55

Q: After reading the information in Blueprint No. 53 about assumptions for a drop (T-bar ceiling), I have additional questions:
Can I get credit for fire-rated acoustic tiles?

A: No, Although this type of construction helps to limit infiltration and exfiltration, the Standards do not have a provision to account for it.

Q: How do I calculate the assembly R-value if the fixtures are IC-rated and covered by insulation?

A: You have three options. First, you can use the insulation value alone to show that the R-value meets the requirement for the prescriptive approach. Second, you can follow the procedures described in Blueprint No. 53 for non-IC-rated light fixtures and include the R-value of the insulation over the light fixture in assembly #2. For example, R-19 insulation becomes:

Blueprint # 55 continued...

Assembly #1 (ceiling tile—90% of ceiling)

$$R = 19 + [1.20/2] + 0.61 + 0.61 = R-20.82$$

Assembly #2 (light fixtures—10% of ceiling)

$$R = 19 + 0.61 + 0.61 = R-20.22$$

$$U\text{-overall} = [(1/20.82) \times 0.9] + [(1/20.22) \times 0.1] = U-0.048 \text{ (R-20.8)}$$

Third, you can conservatively assume that the entire ceiling assembly is made up of light fixtures. In the above example the ceiling would be R-20.22/U-0.049 for a ceiling with IC-rated fixtures covered with insulation.

Q: What if there is no lighting plan and therefore I don't know what percent of the ceiling is made up of light fixtures?

A: In the absence of a lighting plan you may assume the following percentages:

General Commercial/Industrial Work Buildings	10%
Grocery	15%
Industrial/Commercial Storage	7%
Medical Buildings	12%
Office Building	12%
Religious Worship, Auditorium, and Convention Center	16%
Restaurants	12%
Retail and Wholesale	16%
Schools	15%
Theaters	12%
All Others	7%

Q: How do I model the T-bar/light fixture assembly when using computer (prescriptive or performance) compliance?

A: Either the framing function of the ENV-3 calculation is turned off, by selecting “none” for frame type or specify “no penetration” for entries. Follow the procedures outlined above for IC-rated fixtures covered with insulation or the procedures outlined below for non-IC rated fixtures when modeling on a computer (excerpted from Blueprint No. 53).

The light fixtures, whether they are IC-rated or not, are modeled as two assemblies. The first consists of ceiling insulation, acoustic tiles and a T-bar grid. The second assembly consists of the luminaire and insulation, if any.

For example, the first assembly consists of the sum of the effective R-value of the T-bar/acoustic tile combined (50 percent of the tile's R-value to account for the effects of the metal grids), ceiling insulation and two inside air film resistance (0.61 R-value per air film).

Outside air film	0.17
Air film (net 0.61 - 0.17)	0.44
Insulation	19
Acoustic tile (1/2 R-value)	0.60

Inside air film	0.61
R-value	20.82

The second assembly which consists of non-IC-rated light fixtures is calculated as two inside air film resistances (0.61 R-value per air film). If the fixtures include plastic diffusers, the R-value of the light fixture should be calculated as two air film resistances and a 1.5 inch air space (0.77 R-value). Also, if the fixtures are IC-rated and covered by insulation, include the insulation R-value.

Outside air film	0.17
Air film (net 0.61 - 0.17)	0.44
Insulation	0
Inside air film	0.61
R-value	1.22

Blueprint # 56

Q: Near the designer's signature on all of the Certificate of Compliance forms (ENV-1, MECH-1, LTG-1) is a place for the license number and date. Is this the date the license expires, or when the document is signed?

A: It is the date the document is signed.

Q: If a space will not be conditioned for human comfort, is it exempt from the Energy Efficiency Standards?

A: Not necessarily. Although the definitions of mechanical heating and mechanical cooling (Section 101(b)) both use the phrase "human comfort", ASHRAE defines comfort conditioning as conditioning in the range of 55-90°F. Since the scope of the Standards (Section 100) includes a space that is "directly conditioned" within the range of 55 and 90°F a space conditioned in this range must comply. To illustrate:

In SITUATION #1: Space conditioning is provided for computers which must be maintained at 75°F or less (not for human comfort). The space will be unoccupied, except for maintenance and repair.

RESOLUTION: The space must comply since it is maintained within the range of human comfort.

SITUATION #2: A water treatment plant will have heating to prevent pipes from freezing. The thermostat cannot be set higher than 50°F. There will be no human occupancy.

RESOLUTION: If the building official makes the following two

Blueprint # 56 continued...

determinations, the building does not need to comply with the standards: There must be

evidence that the space is not being conditioned to within comfort conditions. This can be determined if a building has only heating and is controlled by a thermostat that cannot be set above 55°F. For example, a thermostat shipped from the manufacturer with a fixed setpoint that is not adjustable by others. Reasonable evidence indicates that the building is not for occupancy by humans. This requires judgment on the part of the building official. Some pertinent questions in making this determination are: Is there no space for people to erect an office inside the building? Is the building a very noisy space? Is the building full of operating equipment that does not require nearly continuous human intervention to operate?

Q: When the building department asks for “Title 24 compliance” on a lighting alteration, what compliance is required?

A: Compliance with applicable mandatory requirements is necessary for every lighting alteration regardless of how big or small the alteration (Section 149(b)1). Some alterations will require compliance with lighting power density requirements (Section 149(b)1 D).

When a project involves relocating light fixtures:

Local switching must be maintained so that, after the alteration, any lights within a room are controlled by a switch within that room (Section 131(a)).

When the project involves rewiring:

- Bi-level switching is required if the altered area exceeds 100 square feet with a light level of 1.2 Watts/ft² or greater (Section 131(b)).
- Separate switching for the daylit area is required if the altered area is within a daylit space that exceeds 250 square feet (Section 131(c)).
- Tandem wiring of one- and three- lamp luminaires is required (Section 132).

Additional requirements:

- Shut-off controls are required when the area served by the altered lighting is 5,000 square feet or more (Section 131(d)).
- New lamps and ballasts that are of a type regulated by the Appliance Efficiency Regulations must be certified (Section 111).
- New lighting controls must meet applicable criteria contained in Section 119.

When fixtures (consisting of lamp, ballast, and housing) are replaced:

- If more than 50 percent of fixtures within the permitted space are replaced, you must comply with lighting power density requirements of Section 146.

When adding lights:

- If the connected load is increased, the lighting alteration must comply with lighting power density requirements of Section 146. (cont...)

Blueprint # 56 continued...

NOTE: There are exceptions and alternative methods of complying with each of these sections which are not covered in this discussion. Consult the Energy Efficiency Standards and the Nonresidential Manual, Chapter 5 for more detailed information.

Q: If an alteration involves moving or installing new cubicle walls, does this trigger any requirements of the Energy Efficiency Standards?

A: Yes. If the partitions are ceiling-height, this alteration requires that accessible local switching for the lights within the room or space be provided and that the switch controls only the lights in that room or space (Section 131(a)).

Q: What are the duct insulation requirements for nonresidential mechanical systems?

A: Section 124 of the Energy Efficiency Standards refers to Section 601, 603, 604 of the Uniform Mechanical Code for installation and insulation requirements. The insulation requirements from Section 604 of UMC are restated below:

Duct Location	Insulation R-value Mechanical Cooling	Heating Degree Days	Insulation R-value Heating Only
On roof On exterior	6.3	<4500	2.1
		4501-8000	4.2
		>8000	6.3
Attics, garages Crawl spaces	2.1	<4500	2.1
		4501-8000	4.2
		>8000	
In walls within floor to ceiling spaces except as noted*	2.1	<4500	2.1
		4501-8000	2.1
		>8000	4.2

*No duct insulation is required on portions of ducts located in walls, and/or within floor to ceiling spaces, when:

Insulation is required when:

- Both sides of space are exposed to conditioned air
- The space is not ventilated
- The space is not used as a return plenum
- The space is not exposed to unconditioned air

When the ceiling forms a plenum, it need not be insulated.

- Not duct insulation is required for:
- Ducts within conditioned space

Blueprint # 56 continued...

- Ducts in basements
- Return ducts in plenums
- Ducts in a cement slab or in the ground

Two additional requirements should be noted:

- Ducts located on the roof on exterior of the building must include an approved weatherproof barrier.
- All joints in cooling system ducts must be sealed. A vapor retarder (not exceeding 0.5 perm) is required on cooling system supply ducts in spaces vented to outside in geographic areas where the summer dew point temperature based on the 2-1/2 percent column of dry bulb and mean coincident wet-bulb temperature exceeds 60°F.

Q: Does a thermostat, required by Section 122(b), need to have numeric setpoints in degrees F? If so, why doesn't it state that explicitly like Section 122(c)2 does?

A: Yes. The thermostat must have numeric setpoints in order to provide the capability of setting heating down to at least 55°F and cooling to 85°F or higher. The language in Section 122(c)2 was added because this was an issue for many hotel/motel guest rooms with controls that indicate warmer and cooler rather than temperature settings, which can result in wasted energy.

Blueprint # 58

Q: As a lighting designer, I would like to be able to prepare compliance documentation without having to coordinate with the envelope and/or mechanical designers. Is it acceptable for me, for example, to use the tailored method while the envelope designer uses computer compliance? Is there any time when we must coordinate?

A: Unless there are trade-offs between building features, they do not need to be modeled together. Therefore, the only time you must coordinate is if there will be trade-offs between various building components.

If the envelope designer uses computer compliance, s/he will indicate in the scope of compliance that lighting is not included. The PERF-1 (Certificate of Compliance for the performance approach) will indicate that lighting compliance is not in the scope of the submittal for the envelope compliance. This provides the plan checker with verification that features of a building that are not part of the compliance documentation are automatically set to “default” values by the certified program.

As an example, in a building with all features permitted at the same time, the envelope could comply with prescriptive requirements, the mechanical could comply with the performance approach to avoid the economizer requirements, and the lighting could comply using any approach including computer compliance. (All the possible variations are explained in Chapter 6 of the Nonresidential Manual.)

Q: I'd like to use the Complete Building Lighting approach for a building with

several different occupancies, none of which is dominant. Since this lighting approach requires that I select only one occupancy type, how do I determine the primary occupancy?

- A:** The complete building method is intended for, and the lighting allotments are based on, a single building type with a lighting plan for the entire building permitted at one time. With multiple occupancies, you have one of four prescriptive choices: Choose the building type that makes up 75 percent or more of the entire building from the Complete Building Method
Choose “All Others” (0.8 Watts/ft²) from the Complete Building Method
Use the Area Category Method, or Use the Tailored Lighting Method.

Q: Are there any tables I can use to obtain information for T-8 lamps and electronic ballasts?

- A:** The Addendum to the Nonresidential Manual has an extensive list of products in Appendix B, including electronic, magnetic and magnetic energy efficient ballasts. If you haven’t received your copy, contact the Energy Standards Hotline (see back page).

Blueprint # 59

Q: Is there such a thing as “official” Energy Commission compliance forms? What are the documentation requirements?

- A:** There are no “official” forms. The forms contained in the Nonresidential Manual are recommended and provided as guidance for consistency. The Administrative Regulations, Section 10-103(a), specify the forms be “readily legible and of substantially similar format and informational order and content” as the forms found in the compliance manuals. This allows the necessary flexibility for program vendors, consultants and building departments to produce their own forms.

Q: Can you explain the oversizing allowances for sizing HVAC equipment when showing compliance with the prescriptive approach?

- A:** First, calculate the building’s heating and cooling loads in accordance with Energy Efficiency Standards, Section 144(b)1.-11. Second, Section 144(b)12. Allows the designer to increase the loads by 10 percent as a safety factor. Third, loads may be increased additionally for pick-up loads (Section 144(b)13.). The designer can either calculate the pick-up loads or optionally choose to increase heating loads by 30 percent and cooling loads by 10 percent.

Other loads and system losses not considered in the first step (Section 144(b)1.-11.) are heat gain across fans, heat loss in ducts, environmental conditions of the condenser location, and such. These loads may also be included in the load calculations.

In summary, the building loads for HVAC equipment sizing can be calculated using one of the following options:
[(Loads from 144(b)1.-11.) + (other loads and system losses)] x (1.10 for cooling and 1.30 for heating) x (1.2 safety factor) or
[(Loads from 144(b)1.-11.) + (other loads and system losses)+ (pick-up loads)] x (1.10 safety factor)

Blueprint # 60

Q: I will be using the area category method for a space that functions as both a warehouse and industrial work area. These two areas are not separated by walls or partitions. Can I assign more than one primary function to these areas?

A: Yes. The designation “primary function” is meant to define the primary activity of the square footage associated with the activity. There is no limit to the number of primary function areas when using the area category method

Q: Can I transfer lighting wattage between areas when I’ve used the area category method for compliance?

A: Only for areas where there are lighting plans submitted and lighting is installed as part of the approved permit.

Blueprint # 61

Q: I can’t find information about Solar Heat Gain Coefficients (SHGC) for the windows in my nonresidential building. Where do I find the SHGC information?

A: Call the California Energy Commission’s Energy Hotline at 1-800-772-3300. All the information you need should be found in the Notice on the Alternative Calculation Method for Nonresidential Buildings-Solar Heat Gain Coefficient Compliance.

Q: On the ENV-1, part 2 of 2 in the azimuth columns, do I need to enter N, S, E, W, or exact degrees from North? The instructions are unclear.

Blueprint # 61 continued...

A: You can use either method. For compliance with the prescriptive standards, N, S, E,

and W (for North facing, East facing, South facing, and West facing) are acceptable as those terms are defined in the *Energy Efficiency Standards for Residential and Nonresidential Buildings* (Standards), Section 101(b) Definitions. Entering the exact degrees from North is also acceptable.

Q: I am trying to comply using the Prescriptive approach. I will be using a computer room air conditioner with electric resistance reheat for dehumidification. Section 144(g) states that electric resistance heating can not be used for space heating. Am I exempt because I am not using the electric heating for "Space Heating"?

A: It depends. Electric resistance heating for reheat purposes must comply with exceptions in Sections 144(d) and 144(g). A gas-fired boiler may be used for all of the reheat. A water coil from a gas-fired boiler can be used as the primary heating with supplementary electric resistance if the design complies with the exceptions in Sections 144(d) and 144(g).

Q: In Table 5-3 of the Nonresidential Manual (Complete Building Method Lighting Power Density Values), what do the designations "high" and "low" mean when referring to the Lighting Power Density (LPD) for "General Commercial and Industrial Work Buildings"?

A: The term "high" refers to "high bay" (where the luminaire is 25 feet or higher from the floor) and the term "low" refers to "low bay" (where the luminaire is less than 25 feet from the floor).

Q: I have a project where a space previously defined as unconditioned would now become semiconditioned. What are the lighting requirements?

A: If changes in an existing unconditioned building results in a space becoming semiconditioned, the Efficiency Standards have no requirements for lighting (Nonresidential Manual, Sec. 2 2 2). However, if an alteration results in a change to the lighting, as described in Section 149, you must comply with the Standards.

Q: If I am going to convert a building from semiconditioned space to directly conditioned space, what are the requirements?

A: The building would be treated as if it was a whole new building. The entire building would have to comply.

Blueprint # 62

Q: In the Nonresidential Manual, page 5-42, it states the wattage for track lighting is calculated using "...45 watts per foot, which is 50 percent of the lighting power rating by the National Electric Code (90 watts per foot)." If the California Energy Commission adopted the 1996 NEC values for track lighting which is now 150 watts per two feet instead of 180, this would change the Energy Commission default value of 45 to 37.5 watts/linear foot of track. Which values should be used?

A: 45 Watts /linear foot of track is the formal interpretation of the Energy Commission

as published in its Nonresidential Manual; therefore 45 watts per linear foot should be used.

Note that the Nonresidential Manual (page 5-42) also states:

Tracks serviced through permanent, installed transformers for low voltage lighting may use the volt ampere (VA) rating of the transformer as the Actual Lighting Power of the track. Standard voltage tracks equipped with current limiters may use the actual volt-ampere (VA) rating of the current limiter as the Actual Lighting Power of the track if (a) The current limiter is an integral part of the track and can only be replaced by manufacturer authorized technicians; and (b) The VA rating of the current limiter is clearly marked on the track and is readily available for the building officials' field inspection without opening the fixture or panels.

Q: What energy code comes into effect for tents, if any? Does this conditioned space still invoke Title 24? Does the fire marshal handle this?

A: If the building official considers the tent to be an occupancy within the scope of Section 100 (a) of the standards and the tent is conditioned, then it must comply with the requirements of the energy code. Note that exception 2 to Section 100(a) states: Building departments, at their discretion, may exempt temporary buildings or structures erected in response to a natural disaster. Temporary buildings or structures shall be completely removed upon the expiration of the time limit stated in the permit.

Q: Can a building department plan checker or inspector ask for further documentation and additional information (other than standard forms) in order to verify compliance with the Standards?

A: Section 10-103(a)3.B states: "The enforcement agency may require the person with overall responsibility for the construction to provide any reasonable information to determine that the building as constructed is consistent with approved plans and specifications and complies with Part 6" (of the Standards). Section 10-103(a)2.B. states: "If any characteristic is materially changed before final construction and installation, such that the building may no longer comply with Part 6, the building must be brought back into compliance, and so indicated on amended plans, specifications, and Certificate(s) of Compliance and shall be submitted to the enforcement agency."

Q: How do I model (for compliance with the Standards) Residential Care Facilities for the Elderly (R2) buildings having both residential and nonresidential components?

A: Section 100(e) states: "When a building is designed and constructed for more than one type of occupancy, the space for each occupancy shall meet the provisions of Title 24, Part 6, applicable to that occupancy." Exception to Section 100(e) states: "If one occupancy constitutes at least 90 percent of the conditioned floor

area of the building, the entire building may comply with the provisions of Title 24, Part 6, applicable to that occupancy, provided that the applicable mandatory measures in Sections 110 through 139, and 150, are met for each occupancy.”

Blueprint # 63

Q: As a building official, can I exempt a tenant improvement of 1000 square feet or less from complying with the *Energy Efficiency Standards for Residential and Nonresidential Buildings (Standards)*?

A: No. There is no such exemption. Some people have misinterpreted the exception noted at the end of Section 10-103(a) of the Administrative Regulations. (cont...) Section 10-103(a) – Permit, Certificate, Informational, and Enforcement Requirements for Designers, Installers, Builders, Manufacturers, and Suppliers – requires a Certificate of Compliance, Installation Certificate, and Insulation Certificate to be provided whenever an “application for a building permit subject to Part 6” is submitted. The exception listed at the end of Section 10-103(a) states the following:

Enforcing agencies may exempt nonresidential buildings that have no more than 1,000 square feet of conditioned floor area in the entire building and an occupant load of 49 persons or less from the documentation requirements of Section 10-103(a), provided a statement of compliance with Part 6 is submitted and signed by a licensed engineer or the licensed architect with chief responsibility for the design.

First, this is not an exemption from complying with the Standards. It is only an exemption from providing certain forms on the plans. Even if exempted by this exception, the builder is required to be in compliance with the Standards.

As a building official, you may choose to exempt the applicant from providing the Certificate of Compliance, Installation Certificate, and Insulation Certificate. In this case, however, the applicant **MUST** supply you with a signed statement saying that the conditioned area of the building is in compliance with Part 6. The signed statement is not based on any form supplied by the Energy Commission.

The key to this exemption lies in the words, “...documentation...” and “...”in the entire building.” It is only the “documentation” that can be exempted; and if there is less than 1,000 square feet of conditioned space in the entire building, then individual tenant improvements that are less than 1,000 square feet cannot be exempted from complying with Section 10-103(a).

If the building official anticipates that the building may eventually house more than 1,000 square feet of conditioned space, he/she should not exempt any tenant improvement from providing the documentation listed in Section 10-103(a). The exemption is not automatic.

Q: Section 100(d) 2.C. in the *Energy Efficiency Standards for Residential and Nonresidential Buildings* (Standards) states:

“C. Semiconditioned nonresidential buildings. Sections 119, 130 through 132, and 146 apply to all new unconditioned buildings within the scope of Section 100 (a).”

Is the word "unconditioned" a mistake? Should it not be "semiconditioned"? If it is "unconditioned", then the *Nonresidential Manual* is inconsistent with the Standard.

A: Yes, the word "unconditioned" is a mistake. This should say "semiconditioned" to make sense. Section 100(d)2C, to which you refer, cross-references the scope which does not include unconditioned buildings. The title for Section 100(d)2C is for “Semiconditioned...” which is not included in the definition of unconditioned. The *Nonresidential Manual* is correct.

Q: How can I best make use of daylighting in a nonresidential building?

A: Hire an electrical engineer who specializes in nonresidential lighting design. Be sure that you follow the resulting design by installing daylighting controls on your light fixtures so that when there is sufficient daylight, the lights are automatically switched off.

Q: The definition in the Standards [Section 101(b)] of an enclosed space is “space that is substantially surrounded by solid surfaces.” What exactly does “substantially surrounded” mean? How big of a “hole” would constitute not being enclosed?

A: A building with a “hole” having less than 20 percent of the wall area should be considered enclosed.

Blueprint # 64

Q: I am interested in relocating a register within a room of a nonresidential building. At the same time, I will be increasing the occupant density. Do I need to meet the ventilation (outdoor air) requirements?

A: No, the standards include an exception for relocating components. For any nonresidential mechanical alterations see section 149 (b) of the Energy Efficiency Standards for Residential and Nonresidential Buildings. “Exception 2 to Section 149 (b): When existing heating, cooling, or service water heating systems or

Blueprint # 64 continued...

components are moved within a building, the existing systems or components need not comply.”

Q: I have an existing retail space that I am converting into an office. I want to remove the existing track-lighting fixtures and install new fluorescent lighting fixtures by extending the tracks and moving the heads. Do I have to comply with the lighting requirements?

A: Yes, by extending the track you are increasing the lighting load and must comply with the standards. The track itself, and not the track heads, is considered the lighting fixture, and extending the track is considered to be adding more lighting fixtures. Since you are increasing the lighting load, it is considered an alteration and according to Section 149, you must follow the requirements set forth in the Energy Efficiency Standards. “Alterations to existing lighting systems that increase the connected lighting load or replace more than 50 percent of the lighting fixtures shall meet the requirements of Section 146.”

Q: I have an existing building in which I want to change the heads of the track lighting from incandescent to fluorescent. I am only making this change in one room, but I have permitted the entire building for alterations not involving the lighting. Do I have to comply with the Standards?

A: No, since your alteration is less than 50 percent of the permitted area, you do not have to comply with the Standards for lighting if you are only changing the heads on the track. The amount of energy that is attributed to a track lighting system is based upon how many linear feet of track there are, and not how many, or what kind of track heads are connected to the track. You may increase the connected lighting load on the existing track up to its rated capacity; however, you cannot increase the length of the track unless a current limiter is used to regulate the total volt-amperes available to the track system so that the total wattage for the new system is equal to or less than the original track lighting system. (See previous question/answer).

Q: When determining compliance with the lighting part of the nonresidential standards, should I include planned plug-in lighting as part of the Actual Lighting Power Density?

A: Yes, Section 146 (a) of the Standards states,
“ The actual lighting power density of the proposed building is the total watts of all planned permanent lighting systems (including, but not limited to track and flexible lighting systems, lighting that is integral with modular furniture, movable displays and cabinets, and internally illuminated case work for task or display purposes) minus any adjustments allowed under Subsections 1 through 4.” The parenthetical portion of this excerpt helps define “planned permanent” lighting. Check to see if the lighting in question is listed in Section 146 (a) 3 as being excluded from the actual lighting power density. If plug-in lighting will be installed to meet the lighting needs of the occupants, it should be shown on the plans. If the plug-in lighting is shown on the plans, and is not listed as an exemption in Section 146, it must be counted as part of the actual lighting power. If an increase or change in the type of lighting happens prior to final inspection, the building inspector should determine compliance based upon confirmation that

the lighting power density of the actual constructed building does not exceed the lighting power density shown on the plans.

Blueprint # 65

Q: What are the most significant changes to the Nonresidential Standards?

A: The most significant changes effect glazing and lighting requirements. Additional changes will impact space conditioning, cool roofs and other aspects of the nonresidential energy code. The next blueprint issue will include more of the nonresidential topics. Glazing: In many climate zones, nonresidential buildings that complied using single glazing under the 1998 Standards may need to have dual glazed, high performance windows to comply with the new 2001 Standards.

Section 143 – Prescriptive Requirements for Building Envelopes Tables 1-H and 1-I include new requirements for windows and skylights. U-factor and SHGC values are set lower: for vertical glazing, the values depend on the window-to-wall ratio, and for skylights the values depend on the type of skylight construction. Climate zones have been regrouped to form groups with the same glazing and other prescriptive envelope requirements. In Section 143(b), the overall heat gain tradeoff equation has been changed to add a cool roof alternative.

Lighting Systems and Controls

Section 130 (c) states that all permanently installed exterior luminaires attached to or powered by the electrical service in the building must either have a minimum efficacy value of 60 lumens/watt or be controlled by a motion sensor. Section 131 says there are no longer exceptions for occupancy sensors or automatic time switches with manual override from the bi-level control requirement. Bi-level controls are required in all spaces larger than 100 ft² and having a lighting load greater than 0.8 Watts/ft². Buildings or separately metered spaces with less than 5000 ft² of conditioned space are no longer exempt from the automatic shutoff control requirement. Section 146 requires portable lighting to be included when determining the actual lighting power. If no specific plans for spaces larger than 250 square feet are provided for portable lighting, the standards specify a value of 0.2 Watts/ft² to be used for determining the actual lighting power density. The actual lighting power for portable lighting may be used if sufficient supporting evidence is provided on the plans.

Blueprint # 66

Q: The Standards state that lighting for theme parks are excluded from the

lighting power density of the building (Section 146 (a) 5). Does this mean that all lighting within the theme park, including offices and retail shops, is excluded?

A: No. A theme park is a large amusement park which includes carnival rides, shows, and exhibits. Only specialty lighting within theme parks is exempt from the lighting power density calculations. All other lighting must comply with the Nonresidential Energy Efficiency Standards.

This includes, retail spaces, restrooms, restaurants, lobbies, ballrooms, theaters and other primary function areas. The treatment of these primary function areas is no different for theme parks than for other building projects. Lighting that is designed strictly for entertainment however, such as the entertainment production lighting used to present the theme of the theme park, may be exempted from Title 24 lighting power density compliance.

Q: I am building a Speculative Occupancy building. How would you recommend that I meet mechanical and lighting compliance?

A: You have a couple of options. The first is to only complete the envelope portion of compliance and leave the lighting and mechanical compliance to the future tenants. If you can anticipate what type of occupancy you will have (for example, when building a strip mall you can anticipate that the tenants will be retail), you can install the lighting and/or mechanical that you expect they will need. Finally, if you are using the performance approach for compliance, use the default values for any feature that is not included in the permit. Using the complete building approach, the default value for retail lighting using complete building method would be 1.7 watts/ square foot.

Q: To determine if an appliance is certified, can I use an industry directory like GAMA or ARI?

A: Yes, but only if the appliance is listed in one of the following chapters of the following chapters of the following directories:

GAMA Directory of Certified Efficiency Ratings for Residential Heating and Water Heating Equipment:

Chapter 1:

Section 1: Residential Gas Central Furnaces
Section 2: Residential Oil Central Furnaces
Section 3: Residential Gas Boilers
Section 4: Residential Oil Boilers

Chapter III:

Section 1: Gas Water Heaters
Section 2: Oil Water Heaters (cont...)
Section 3: Electric Water Heaters

ARI (Applied Air-Conditioning Products Directory)

Sections: GSHP, GWHP, PTAC, PTHP, ULE, WSHP only

ARI (Unitary Directory)

Also, not all manufacturers participate in the GAMA or ARI directories, so if an appliance is not listed in a GAMA or ARI directory, please check with the Commission to see if the manufacturer has certified the appliance directly to us.

Finally, if it turns out that the appliance is not properly listed in the Commission's own directory, it is considered uncertified and may not be installed.

Blueprint # 67

Q: Do occupancy sensor devices have to be certified, and if so, how can I tell if they are certified?

A: Yes. You may use occupancy sensors only if their manufacturers have certified to the Energy Commission that their products meet the requirements of Section 119 of the Standards. To determine if they are certified, contact the Energy Commission hotline at 1 (800) 772-3300.

Q: Is equation 1A for adjusting the thickness of pipe insulation in Section 123 of the *Nonresidential Building Efficiency Standards* publication number P400-01-024 correct?

A: No. There is a typographical error in this publication that also occurred in the publication of the 1998 Standards. The equation is correctly expressed in the 1998 and upcoming 2001 *Nonresidential Manual* and the *California Building Code* published by the ICBO. The correct equation is:

EQUATION 1-A—INSULATION THICKNESS EQUATION

$$T = PR \left[\left(1 + \frac{t}{PR} \right)^{\frac{K}{k}} - 1 \right]$$

WHERE:

- T = Minimum insulation thickness for material with conductivity K , inches.
- PR = Pipe actual outside radius, inches.
- t = Insulation thickness from Table 1-G, inches.
- K = Conductivity of alternate material at the mean rating temperature indicated in Table 1-G for the applicable fluid temperature range, in Btu-inch per hour per square foot per °F.
- k = The lower value of the conductivity range listed in Table 1-G for the applicable fluid temperature range, Btu-inch per hour per square foot per °F.

Blueprint # 68

Q: Is There a recommended method to account for additional chandelier wattage

and for filling out the related lighting forms LTG-1 and LTG-2?

A: Yes. To account for chandelier wattage:

First, determine the allowed chandelier wattage:

The smallest of the following values may be added to the allowed lighting power listed in “Area Category Method,” Table 1-N in Section 146(b)2 of the 2001 Efficiency Standards. For ornamental chandeliers and sconces that are switched or dimmed on circuits different from the circuits for general lighting, use the smallest of either a, b, or c listed below.

- a. 20 watts per cubic foot times the volume of the chandelier or sconce; or
- b. One watt per square foot times the area of the task space that the chandelier or sconce is in; or
- c. The actual design wattage of the chandelier or sconce

Second, the LTG-2 and LTG-1 forms should be filled out as follows:

1. On the LTG-2 forms, under the “Area Category Method,” on a separate line show the calculations for a or b above or use c (the actual design wattage) and enter the resulting wattage in the “Allowed Watts” column. Subtotal the “Area Category Method, Allowed Watts” column of the form. Be careful not to double count the “Allowed Lighting Power” with the “Actual Lightings Power.”
2. On the LTG-1 form enter the additional wattage in the “Installed Lighting Schedule” section, “SUBTOTAL FROM THIS PAGE” box of the form.

Q: Did the Commission change the energy code requirements that prohibited the use of cloth backed rubber adhesive duct tape unless it is installed with mastic and mechanical fasteners?

A: No. This prohibition has been in effect for the tight duct credit since 1999. in the 2001 Standards, the Commission made the prohibition mandatory for all residential and nonresidential duct systems. Two cloth duct tape manufactures petitioned the Commission to reconsider the prohibition, resulting in a special rule making proceeding on the issue. The information submitted during this proceeding, including laboratory testing results, expert testimony and written and oral comments, reinforced the appropriateness of the existing prohibition. The Commission’s decision to NOT change the Standards was supported by the California Building Officials, California Building Industry Association, Insulation Contractors Association, Pacific Gas and Electric Company, Lawrence Berkeley National Laboratory, Proctor Engineering Group and Intertape Polymer Group (a cloth duct tape manufacturer). You can review the Notice of Committee Conclusions that explains the reasons for continuing the prohibition at: www.energy.ca.gov/title24/ducttape/notices/2002-03-26_COM_CONCLUSIONS.PDF.

Q: Is laminated glass that is sandwiched by two outer layers of glass with an inner layer material considered a double pane window?

A: No. To be considered a double pane window an air space must exist between the two glass panes, regardless of lamination and coating. The space between the two panes needs to be hermetically dry and sealed airtight. The airspace is commonly 3/16-inches to 3/4 –inches wide.

Blueprint # 69

Q: A nonresidential building is built without tenants to occupy it, the building has a common area and spaces for tenants. The builder installs the HVAC system chiller, boiler fans and controls. They also install the distribution system for the common area, but do not run the HVAC system until the first tenant spaces are occupied. The builder does not install insulation at the time of construction, preferring to wait until tenants move in. Must the inspector write this up as non-complying with the energy efficiency code?

A: No. The energy efficiency code allows for speculative (“spec”) buildings that are not occupied upon completion of the shell. Note that for common areas, where the HVAC system is fully installed, the envelope compliance must be completed. Not complying with the code at the time of initial construction carries consequences. For example, tenants located in areas of the building with large percentages of glass, or the last tenant to move in, may find that there is insufficient HVAC capacity to serve their area.

Buildings can comply on a component-by-component basis with mandatory and prescriptive measures. For example, if just the building’s central mechanical plant is completed, it must comply with the applicable mandatory and prescriptive measures by using either the prescriptive or performance approach. Envelope, lighting and water heating compliance can wait until tenants move in. The prescriptive or performance approaches (except for lighting only, which is limited to the prescriptive approach) could be use. Under either of these options, lighting an achieve compliance by using the prescriptive options (whole building, area method or tailored lighting). For more information, see Section 2.2.2F, of the Nonresidential Manual.

Q: Do the building energy efficiency standards apply to boilers, heat exchangers and related equipment that serve a process load?

A: No. The standards do not apply to equipment that serves a process load where that

process load - or any recovered waste energy from that equipment- is not being used for space conditioning.

The standards apply only if the following conditions are met. First, the enclosed space is being heated or mechanically cooled by this process energy or by associated recovered waste energy. Second, the occupancy type of the building (type A,B,E,F,H,R or S) is included in the energy standards. If either of these conditions is not met, then energy compliance does not have to be done.

Note that the equipment may need to comply with appliance standards requirements, depending on the type of equipment.

Q: Do solar day lighting tubes need to meet the same requirements as skylights?

A: No. The National Fenestration Rating Council (NFRC) now has an available methodology to standardize testing of solar day lighting tubing. For more information on the NFRC test method, phone (301) 589-1776.

For non-NFRC labeled solar day lighting tubes, use the Energy Commission's Default Table for the default values. If the diffuser is double pane, use the double pane default values, (The diffuser is the piece that is attached to the conditioned side of the ceiling that helps distribute day light into the space. The diffuser must be sealed and caulked to prevent infiltration into the conditioned space [Section 117 of the Standards.]

Blueprint # 70

Q: Did one of the optics expire for NFRC certification of manufactured windows used for nonresidential buildings?

A: Yes, after October 1, 2002 SHGC values for manufactured windows can no longer be calculated based on center of glass values. Now the SHGC must be based on NFRC 200 testing and labeling or obtained from the default table, Table 3-12 of the Nonresidential Manual. SHGC values for site-assembled windows in buildings less than 100,000 square feet or with less than 10,000 square feet of site-assembled windows can still be calculated based on center of glass values. See Table 3.11 of the Non residential Manual.

Blueprint # 71

Q: Can you install a thermostat that cycles the ventilation fan off when the temperature set point has been satisfied (Sometimes called “a residential thermostat”) in a non residential building?

A: No, Standards Section 122(c)1 requires the minimum outside air ventilation, appropriate to the occupancy type of the building, to be provided continuously when the space is occupied in nonresidential buildings.

Q: Do the Energy Commission’s Building and Appliance Standards apply to federal military bases?

A: **Building Standards** Construction on federal land (bases, federally-owned office buildings, etc.) does not have to comply with the building standards. Buildings that are leased by the federal government, however must comply with the building standards.

Appliance Standards The appliance standards apply if the applicant is sold or offered for sale in California.

Q: What are the new requirements for distribution transformers?

A: Enforcement of the energy efficiency standards for distribution transformers is within the authority of both the California Energy Commission and local building officials. The Commission enforces the standards at the point of retail sale through appliance regulations found in Title 20. Local building officials enforce the standards through their authority over “Title 24 construction.” That is, local building officials are responsible for enforcing the state’s energy efficiency standards for buildings, which are found in Title 24 of the California Code of Regulations.

In 2002 the Energy Commission adopted Appliance Efficiency Standards for such devices. The standards appear in Section 1605.3(t) of Title 20 of the California Code of regulation. The standards apply only if the transformer is a “low-voltage dry-type distribution transformer,” which is defined as “a transformer that has an input voltage of 600 volts or less, that is air cooled, and that does not use oil as a coolant.” The standards apply only to units manufactured on or after March 1, 2003.

More than a dozen types of transformers are excluded from the definition of “low voltage dry-type distribution transformer.” These excluded types are defined in Section 1602(t) of the Commission’s Appliance Efficiency Regulations (Title 20). To locate excluded transformers go to:

www.energy.ca.gov/appliances_rulemaking/notices/index.html and click on the link for “April 16, 2003 Appliance Efficiency Regulations (Adobe Acrobat PDF file).”